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# THE HOUSE WE BUILD

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# THE HOUSE WE BUILD\*

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It is my purpose to discuss how the structure of the home may be designed and built so as best to meet the demands upon it. In order to do this I shall take up, first, a brief review of what we expect from the structure of a house; secondly, an inventory of the resources available to the present-day builder; and thirdly, structural elements and workmanship.

## Performance Requirements

It has become common in construction, as well as in other fields, to define the standards of performance expected of the finished product.

What is it that we expect from the structure of a house? In the first place we must have stability in the foundation and in the structure. Cracks in the woodwork and plaster, doors that stick and jam, and openings that let in rain and snow, are the inevitable consequences if the foundations settle and crack, or if the walls or framework become distorted. Adequate protection from wind, rain, and snow is essential. Nothing adds so much to the expense of keeping up a house or makes it run down so fast as chronic leakage, and for this reason, the roof, wall surfaces, and danger points, such as flashing and window

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openings, should be water-tight. A dry cellar and reasonable insulation against heat and cold are also expected of a modern house.

Sufficient protection against fire and lightning is desired by every prudent owner.

Durability and economy in maintenance should be considered when a house is built. They depend largely on factors already mentioned but also involve the use of proper materials and workmanship at other points.

Good appearance outside and inside is rightly emphasized as another quality for a satisfactory structure, and it is unnecessary to dilate on the fact that it depends on good proportion, adaptation of the house to its setting, and good taste in combining the various elements of the house, rather than upon expenditure for costly knickknacks.

Sanitation and health are fundamental, and we want a house that is easy to keep clean and which is so well built that rats and vermin can not readily get into it or become easily established. The structure should be adapted, wherever possible, to convenience in housekeeping and to the installation of mechanical equipment to lighten housework.

Finally, the home owner has to keep an eye constantly on his pocketbook while he plans. Economy in first cost and in operation after the house is built is essential.

#### The Home Builder's Resources

The resources of no two rural home builders are alike. There are families today who are like their pioneer ancestors in that they must depend mainly on their own resourcefulness and ability to do hard work, using whatever raw materials, - usually logs and stone in this part of the country, - are available, with the minimum of purchases from outside, such as window sash and a few iron and steel products. Others are able, for one reason or another, to afford up-to-date structures that embody all the worth-while features that present-day industry provides.

In a consideration of the resources of rural home builders, however, some general comparisons may be made with those of the city home builder. We may recall the old-fashioned house raisings wherein the spirit of co-operation and friendliness which has so permeated our rural life in America was revealed at its best during generations. I believe it is safe to say that this underlying spirit is still strong enough so that a family established in any rural community in America can count on obtaining much sound and helpful advice on building. The friendly counsel of an observant man or woman who has made a specialty or hobby of building can be invaluable, although it must be admitted that much of the free advice offered to a home builder may be not only worthless but a liability if it is followed.

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Nearly every home builder finds it hard to get a house of the size and kind he wants at a cost which is within his reach. For the rural builder manufactured materials come relatively higher and labor relatively cheaper than for the city builder. Higher transportation charges usually add to the price of articles purchased in the country, while the owner's own labor and lower wage scale make the addition of a greater amount of labor less burdensome financially than in the city. Hence a higher-priced material, which saves labor on the job, may be profitably used in the city but not necessarily in the country. All owners must decide whether they want a small structure of high quality, well equipped with conveniences, or a larger structure of a less expensive type. The cost per room of two houses of approximately the same size in the same locality, for example, may vary from \$600 or \$800 to \$2,500 or \$3,000.

### Building Codes

The city builder is often saved, willy-nilly, from making certain mistakes because his building has to meet certain building-code requirements. On the other hand, these same building-code requirements may, because they are obsolete or poorly frames, involve him in extra expense. In many cities, for example, the plumbing soil stack must be 4 inches in diameter, in spite of the fact that 3 inches has been found satisfactory in practice for small dwellings, and has been found, on the basis of experiments at the Bureau of Standards, to be more satisfactory from a sanitary point of view. Needless to say, the 3-inch stack is not only cheaper in first cost, but is much less expensive to install since it fits much more readily into walls or partitions of customary dimensions.

### Materials

The country builder may, theoretically, have a wider range of choice of materials than the city builder. He may be able to use posts or hewn timbers from his own woodlot, stone from his own fields, or sand and gravel for concrete from his own deposits. Yet he can purchase also basic and special materials from a local dealer or from a mail-order concern. As I have already indicated, however, financial limitations may severely restrict his purchases.

### Setting of the House

The country home builder has more space, light, and air, and as a corollary to this is usually farther away from his neighbors than his city cousin.

### Availability of Expert Knowledge

The city builder can more easily call upon builders who have had experience in building houses of the same type, but, as I have already suggested, the country builder may be able to obtain more helpful advice from his relatives and neighbors - a process made easier by the advent of the motor car and improved road.

The first part of the report deals with the general situation of the country. It is a very interesting and informative study of the country's development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's development.

The second part of the report deals with the economic situation of the country. It is a very interesting and informative study of the country's economic development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's economic development.

The third part of the report deals with the social situation of the country. It is a very interesting and informative study of the country's social development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's social development.

The fourth part of the report deals with the political situation of the country. It is a very interesting and informative study of the country's political development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's political development.

## Accessibility of Printed Material

The city builder has readier access to public libraries, but I believe that the country builder can readily obtain such pamphlets as he may require in connection with building his home at a relatively small expense.

The modern builder to be successful must be able not only to cope with situations as they come up but must have an idea of what information can be obtained readily from printed material. He should know where and how to get what he wants without having to go through quantities of irrelevant or unauthoritative material.

## Laying Out the Site

I need not treat the subject of laying out the site since you are all more familiar than I with the problems involved, and you all know the Farmers' Bulletin No. 1132, of the Department of Agriculture, entitled "Planning the Farmstead." If the benefit of the doubt can be given to a site that will be as free as possible from ground water that might reach the cellar wall or floor directly or by means of capillary attraction, so much the better.

## Foundation Walls and Cellar

Good foundations, as I have already indicated, are essential for a satisfactory house. The foundation wall itself should be at least 8 inches thick if of solid concrete. It should extend in depth below the frost line and have adequate footings. It is impossible to recommend a uniform width of footings because so much depends upon the bearing value of the local soil. That is one place where general rules need to be considered with relation to local conditions. In order to insure the cellar against flooding or chronic dampness it may be necessary to lay draitile outside the wall or to use a damp proofing compound on the outside. The cellar floor itself may have to be laid on gravel or cinders, and it is well to remember that a leaking cellar is much harder and more costly to remedy after building than before. A good cellar-floor drain to carry off water which may enter, or water which may be used for cleaning, is most desirable, especially so when the floor, if it has a pitch, slopes toward the drain.

Good concrete is occasionally the product of good luck rather than good management. The careful builder will do well to consult the pamphlets of the Department of Agriculture and of the Portland Cement Association, which explain the proper mixtures, including the amount of water used - a most important factor - and means for determining whether or not the sand and gravel used contain too much silt or inorganic matter. Such precautions may take time but are well worth the assurance of a good piece of work. Furthermore, the pamphlets contain many helpful suggestions for lessening the amount of work involved. If the family can not afford to take the precautions necessary for a good cellar and chooses not to have one it is better to rest the house on piers of adequate depth than on a shallow wall. In such a case there should be a free circula-

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OF AMERICA

FROM 1776 TO 1876

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JOHN F. JOHNSON

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tion of air under the house in order to prevent rapid decay of the floor joists and other wood on the under surface, and heat insulation under the flooring is desirable in the climate of most parts of the country.

### Walls and Framing

It may seem unnecessary to recall the fact that the walls and framework of the house should be substantial, with all the important parts well tied together. Yet, whenever a high wind comes, we learn of roofs that merely rest on the top of brick walls, without being anchored by ties to the masonry; frame houses that get out of plumb because they have not had proper diagonal bracing; and porches and ells that become detached because they are not tied to the main structure. In regions subject to high winds, frame houses without plaster to add weight are in an especially dangerous position. The building code committee of the Department of Commerce recommends that all frame houses be anchored to the foundations. The too familiar sagging roof line is generally a sign of the spreading of side walls because of thrusting of the rafters, a condition which might have been taken care of by proper ties at the line where the roof meets the wall.

There are, of course, many other points involved in good framework. It is fairly common for the interior framework to be built up with a greater depth of horizontal timbers inserted between the vertical members than in the framing in the outside wall. This results in greater shrinkage, which lets down the interior partitions, and causes distortion of the whole frame and cracks in the plaster.

Diagonal sheathing is recommended as preferable to horizontal. Eight-inch brick walls should have a row of headers at least every sixth course. These and many other points are covered in the pamphlet entitled, "Recommended Minimum Requirements for Small Dwelling Construction" by the building-code committee of the Department of Commerce.

Possibly there are areas where ledge rock, field stones, and locally burnt brick could be used more extensively in rural construction.

### Roofing, Flashing, and Weather Surface of Walls

Needless to say, it does not pay to skimp on surfaces exposed to the weather. It does not pay, for example, to expose too much of the shingle surface to the weather. The rural builder can make his labor count to full advantage in assuring good workmanship on roofing, flashing, weather boarding, and pointing up of brick walls. Furthermore, he can see that the openings around window frames in brick walls are well caulked.

### Fire and Lightning Protection

Adequate protection against fire is particularly important for farm homes, where the services of city fire departments are not available. In many houses there is a free passage for air from the cellar to the attic between





the studs in the outside walls. This means that a fire starting in the basement or on the first floor is given every opportunity to spread to the whole house. It also gives cold air from the attic free play to chill the basement and the side walls of rooms, and furnishes rats and mice opportunity to disport themselves (and die) wherever and whenever they please. The remedy is to insert masonry or some other incombustible material, or snugly fitted pieces of 2 x 4, in these spaces at the floor and the top ceiling levels.

Chimneys, fireplaces, stoves, furnaces, and stovepipes are frequently the sources of fires. Farmers' Bulletin 1230, of the Department of Agriculture, entitled "Chimneys and Fireplaces," contains excellent material on the importance of flue lining and of incombustible materials around chimneys. This pamphlet also tells how fireplaces may be equipped so as to serve as warm air heaters. Pamphlets of the Department of Agriculture and the Bureau of Standards contain directions for protection against lightning.

#### Interior Wall Finish, and Heat Insulation

In this field the home builder has a wide range of choices. Assuming that there is already sheathing, good building paper tacked on to it under the weather boarding is probably the least costly step towards assuring a house that can be kept comfortably warm at reasonable expense. Weatherstripping around doors and windows comes next. Insulating materials over the top floor ceiling joists or under the roof and in the walls, and storm windows may all be used to advantage, as is pointed out in Letter Circular No. 227 of the Bureau of Standards. It must be remembered that it is relatively hard to add heat insulating materials in the walls after the house is built, whereas weather stripping, or heat insulation on the attic floor or under the roof can be added at any time.

The interior walls may be finished with wood or metal lath and plaster, with "gypsum lath," a type of composition board which takes the place of lath and one or two coats of plaster, or with a wall board which can be left as finished at the factory, or decorated as desired; or interior walls may be ceiled with matched lumber.

#### Plumbing and Bathroom

A great deal of poorly designed plumbing goes into houses whether in the city or in the country. The report of the Department of Commerce Subcommittee on Plumbing gives diagrams for a proper layout of the waste system for small houses, and as you know, septic tanks and sewage disposal are the subjects of pamphlets by the Department of Agriculture and the Public Health Service.

#### Other Points

Pamphlets on electric wiring and fixtures are readily obtainable from dealers or manufacturers.

To continue the discussion throughout the entire house at this rate would require hours.

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I can only refer in passing to the fact that the Forest Service issues booklets on the use of wood and its preservation against decay. Farmers' Bulletin 1472, entitled "Preventing Damage by Termites or White Ants," furnishes directions for protection against termites. Home-building magazines list the names of manufacturers of electrical equipment, millwork, paints, and many other materials used in dwelling construction, who furnish upon request pamphlets describing the use of their products.

Since I have already mentioned the Portland Cement Association, I also wish to refer to the helpful pamphlets available from the National Lumber Manufacturers' Association, those furnished by the various regional lumber associations, the common and face brick manufacturers, and many others.

You all know of the Superintendent of Documents' price list No. 72 listing government pamphlets of interest to suburbanites and home builders.

Although I have dealt mainly with the construction of new houses, I hope that the discussion and references to material will also have some application to the remodeling and modernizing of existing houses, a type of activity which I believe is especially important in the States represented at this conference, where the furnishing of accommodations to vacationists and tourists has become widespread.





